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DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES



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March 20, 1986

Gene Taylor
Montana Operations Office
Environmental Protection Agency
Federal Building
301 S. Park, Drawer 10096
Helena, MT 59626

Dear Gene:

It has come to our attention that EPA is interested in determining the source or sources of abnormally high trace metal concentrations in the soils surrounding East Helena. As you are aware, several studies have shown that soil concentrations of lead, arsenic, cadmium, zinc, and copper are abnormally high in the area of East Helena and that the concentrations decrease with distance from the ASARCO/American Chemet industrial complex. The department is convinced that the ASARCO smelter, the ASARCO zinc plant (formerly Anaconda Company) and the American Chemet plant are all partially responsible. These sources have emitted large amounts of trace metals into the East Helena atmosphere and deposition over the years is responsible for the contaminated soil. Although there is a bulk of information pointing to the ASARCO/American Chemet industrial complex as the source of the contamination, only the recent chemical mass balance work done by ASARCO and the department has been able to apportion the contribution to ambient concentrations from individual sources within the complex. The following discussion describes much of the evidence pointing to the entire complex as well as specific sources within the complex. The discussion relies on the results of several different studies conducted in East Helena including the East Helena Chemical Mass Balance Study, soil sampling, snow sampling and air monitoring.

Soil sampling conducted by EPA in 1969 and 1970 indicated that soil concentrations of lead, arsenic, cadmium and zinc were abnormally high in the area of East Helena and that concentrations decreased with distance from the ASARCO/American Chemet complex. Soil sampling conducted as part of the "1983 East Helena Blood Lead Study" also showed abnormally high levels of arsenic, cadmium, copper, lead and zinc. In addition, lead concentrations decreased with distance from the ASARCO/American Chemet complex. This geographical distribution of soil trace metal concentrations provides convincing evidence that the

Site East Helena
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Confidential: Yes ☐ No ☒
Admin. Record: Yes ☒ No ☐
Key Words/Comments: Letter from MT
Air Qual. Bur. implicating
ASARCO, Anaconda and
American Chemet, jointly,
for high metals concentra-
tions in soils and dust
in East Helena.

original source of the lead is the ASARCO/American Chemet complex. In addition, the time necessary to accumulate such concentrations indicates that the source of the trace metals has been in existence for a long time.

The department collected snow samples around East Helena during the winter of 1980 and 1981 and analyzed them for lead. The results showed decreasing lead concentrations with increasing distance from the ASARCO/American Chemet complex. The highest concentrations were located immediately around the ASARCO/American Chemet complex with lobes of high concentrations extending to the north and the southwest. The snow samples not only point to the ASARCO/American Chemet complex as the source of the lead, but also establish the fact that heavy metal deposition was still occurring at a substantial rate in 1981.

The department has conducted ambient air monitoring for trace metals in the East Helena area for over ten years. The data indicate that very high concentrations of heavy metals are present in the East Helena atmosphere. Lead levels far exceed both the state and federal ambient air quality standards. Although there are no ambient air quality standards for other heavy metals, high concentrations exist in the East Helena area. The data also indicate that trace metal concentrations decrease with distance from the ASARCO/American Chemet complex and that significant emissions are still occurring.

Although the previously mentioned data provide overwhelming evidence that the ASARCO/American Chemet complex is the source of the heavy metals in the soil, only the Chemical Mass Balance Study conducted from 1982 to present is able to differentiate between specific sources at the complex.

Results from the first CMB analysis in 1982 indicated that the primary sources of ambient lead in the East Helena area were re-entrained (lead contaminated) road dust, fugitive dust off of handling and storage of ore concentrates, blast furnace upsets, and the ASARCO zinc plant (formerly Anaconda Company). It should be noted that due to the similarity in chemical composition of the ASARCO zinc plant emissions and emissions from the American Chemet plant, the lead emissions were assigned to the ASARCO zinc plant based on meteorological considerations (wind direction). Later CMB analysis, after the zinc plant was shut down, indicates that American Chemet may also have been a significant lead source. The 1984 CMB results indicate that the primary lead sources are the ASARCO sinter building, the ASARCO new deal building, the American Chemet pyrometallurgical building, and re-entrained road dust. In regard to total suspended particulates, the major contributors are re-entrained road dust and the American Chemet pyrometallurgical plant. The high zinc and copper concentrations observed during 1984 at the Hadfield and Firehall sites are probably the result of excessive emissions from the American Chemet plant and are why the CMB identified the American Chemet plant as a significant contributor to TSP. A twenty-four hour zinc concentration of 114 ug/m^3 was recorded at the Hadfield site during 1984.

The CMB analysis primarily dealt with source apportionment of lead concentrations, but the actual chemical analyses of the various emissions also indicated (1) that the American Chemet plant is a major emission source of copper and zinc and a lesser source of other heavy metals, (2) that the old zinc plant was a major source of zinc and lead and, to a lesser degree, other trace metals, and (3) that the remainder of the ASARCO complex is a major source of all trace metals. It is reasonable to believe that each of these plants (ASARCO, American Chemet, and the ASARCO/Anaconda zinc plant) has emitted heavy metals over their lifetime in a manner similar to that described here. It is also reasonable to believe that all three are responsible for the contamination of East Helena soils.

In light of this information the department is convinced that the ASARCO smelter, the shutdown zinc plant, and the American Chemet plant are jointly responsible for the abnormally high trace metal concentrations in East Helena's soil.

If you have any questions concerning the details of any of the above studies, please telephone or come over to our office.

Sincerely,



Bob Raisch, Supervisor
Operations Section

BR:kh